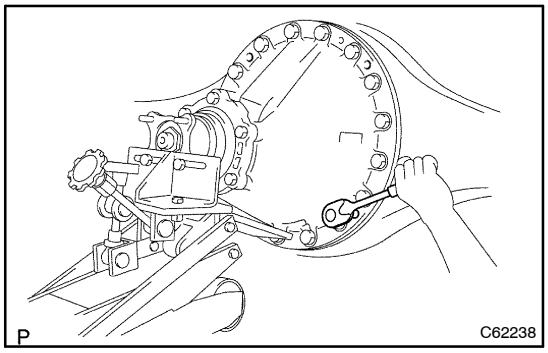
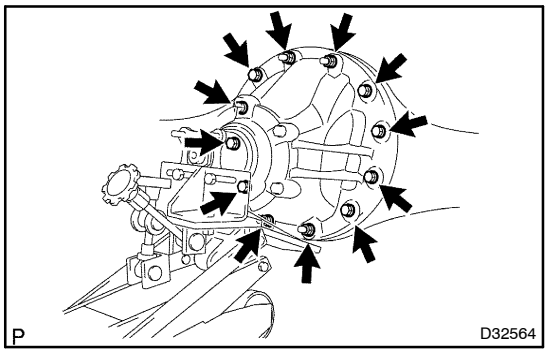
290AB–01

# OVERHAUL

1. DRAIN DIFFERENTIAL OIL (See page 29–3)
2. REMOVE REAR AXLE SHAFT (See pub No. RM1008E, page 30–72 or 30–75)
3. REMOVE PROPELLER SHAFT ASSY (See pub No. RM1008E, page 30–4 or 30–11)

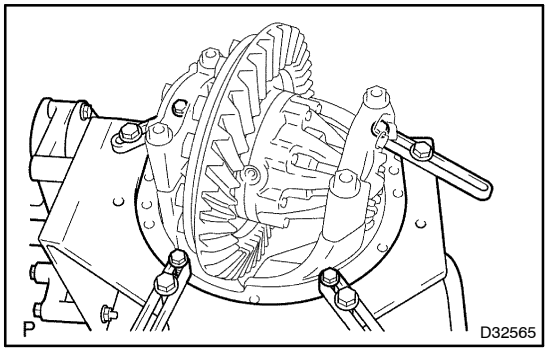



4. REMOVE REAR DIFFERENTIAL CARRIER ASSY
(a) Using a jack, support the differential carrier.

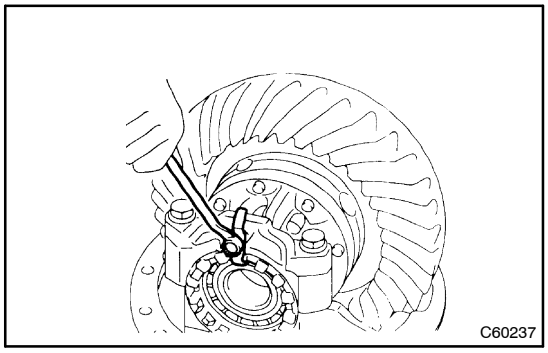



(b) Remove the 8 bolts, 4 nuts and differential carrier.

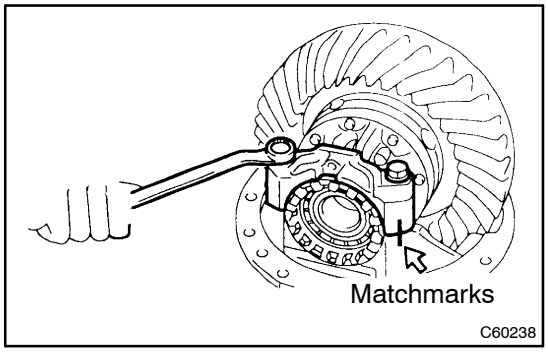
**NOTICE:**
**Be careful not to damage the installation surface.**



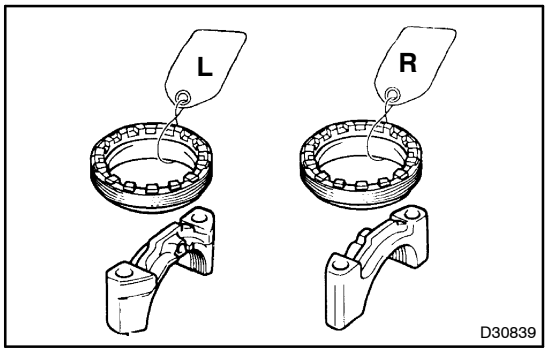

5. REMOVE REAR DIFFERENTIAL CASE SUB–ASSY
(a) Fix the differential carrier.



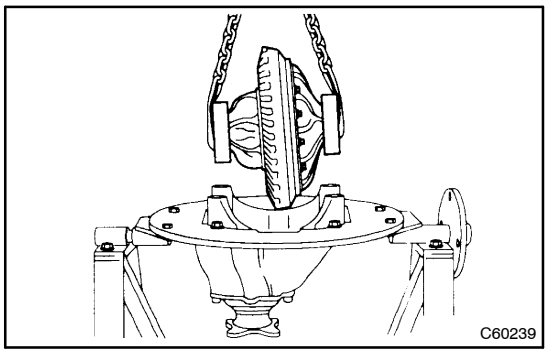

(b) Remove the 2 adjusting nut locks.



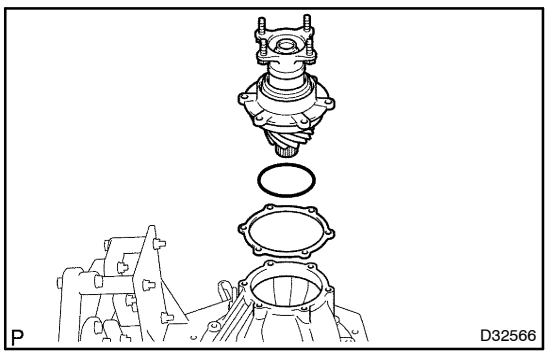

(c) Place matchmarks on the bearing cap and differential carrier.
(d) Remove the 4 bolts, 2 bearing caps and 2 adjusting nuts.
(e) Remove the differential case together with the bearing outer races from the carrier.



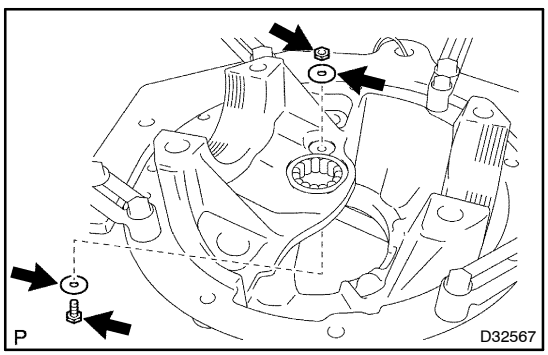

HINT:
Tag the removed parts to show the location for installation.



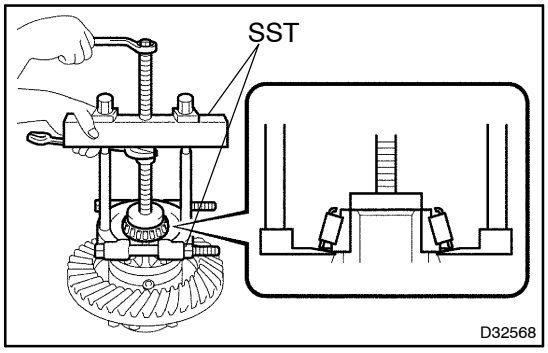

(f) Using a chain block, remove the differential gear from the differential carrier.
(g) Remove the side bearing outer race.
HINT:
Tag the removed parts to show the location for installation.




**6. REMOVE DRIVE PINION SUB–ASSY**
(a) Remove the 6 bolts.
(b) Remove the drive pinion, shims and O–ring from the differential carrier.
HINT:
For easy removal, remove the outer races, using a brass bar and hammer.




**7. REMOVE PILOT BEARING OUTER RACE**
(a) Remove the bolt, nut and 2 bearing retainers.
(b) Remove the outer race from the differential carrier.

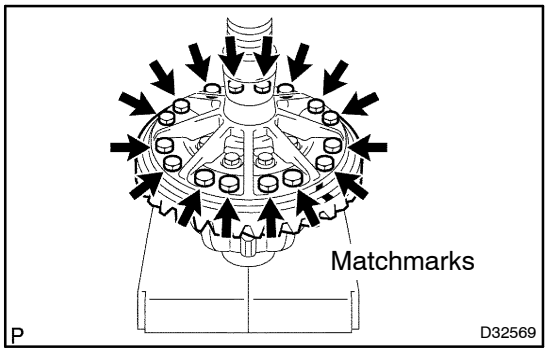



**8. REMOVE SIDE BEARING INNER RACE**

(a) Using SST, remove the 2 inner races from the differential case.

SST 09950–60020, (09951–00680), 09950–40011, (09957–04010), 09950–00020, 09950–00030

If reusing the bearings, arrange them so that the right bearing and left bearing can be distinguished.

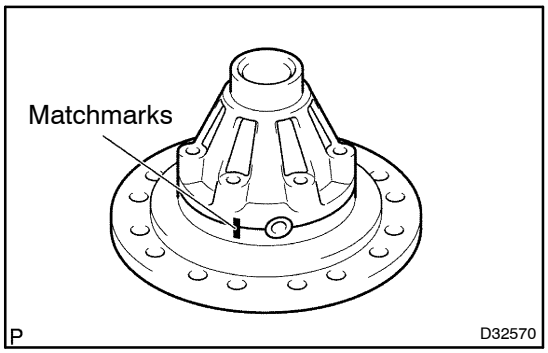



**9. REMOVE RING GEAR**

(a) Place matchmarks on the ring gear and differential case.
(b) Using a press, fix the differential carrier.
(c) Remove the 16 bolts.
(d) Using a plastic hammer, remove the ring gear to separate it from the differential case.

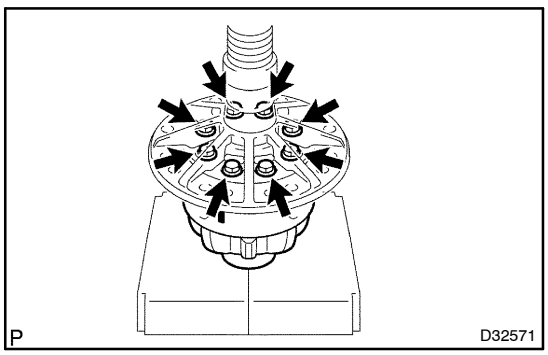
**NOTICE:**

**Be careful not to drop the ring gear.**

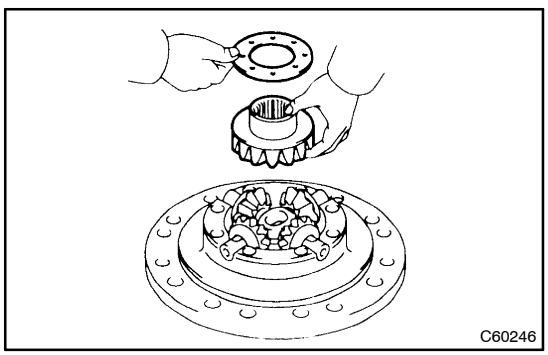



**10. REMOVE DIFFERENTIAL CASE**

(a) Place matchmarks on the LH and RH cases.

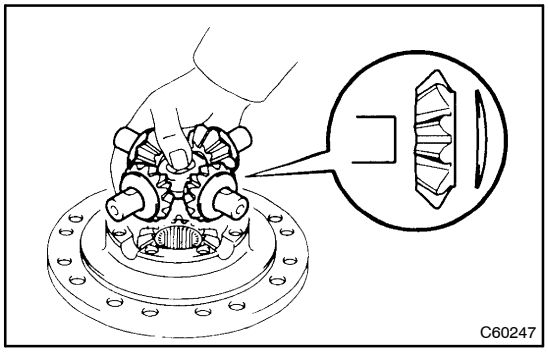



(b) Remove the 8 bolts.
(c) Using a plastic hammer, separate the LH and RH cases.

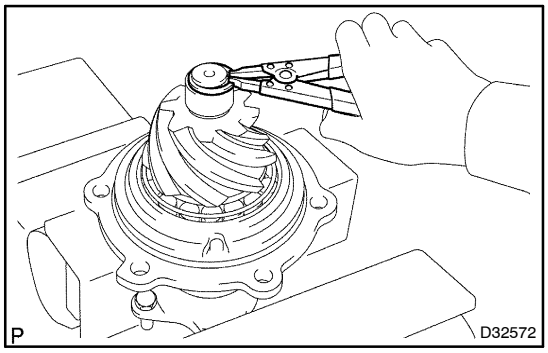



**11. REMOVE REAR DIFFERENTIAL SPIDER**

(a) Remove the side gear thrust washer and side gear.




(b) Remove the 4 pinion gear thrust washers, 4 pinion gears and spider.
(c) Remove the 4 side gear thrust washers and side gear.

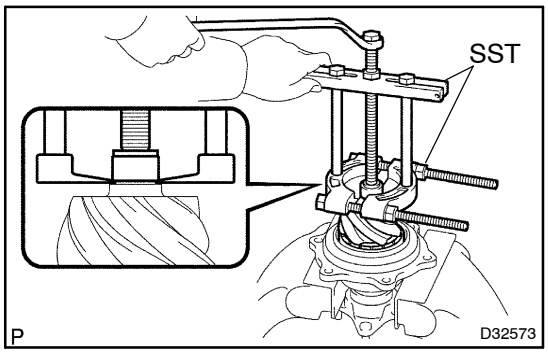



**12. REMOVE PILOT BEARING INNER RACE**

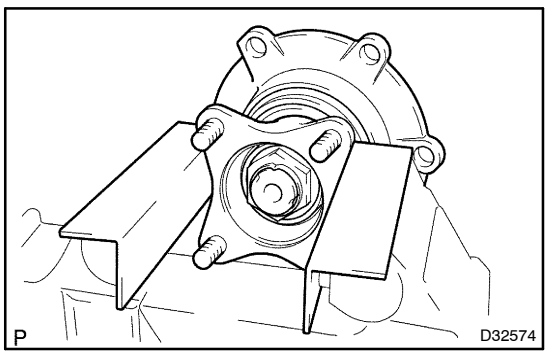
(a) Using a snap ring expander, remove the snap ring.
(b) Using a grinder, make a groove to the inner race.

**NOTICE:**

**Use a cloth or similar object as a cover, at the time of snap ring installation, to prevent the snap ring from flying off.**

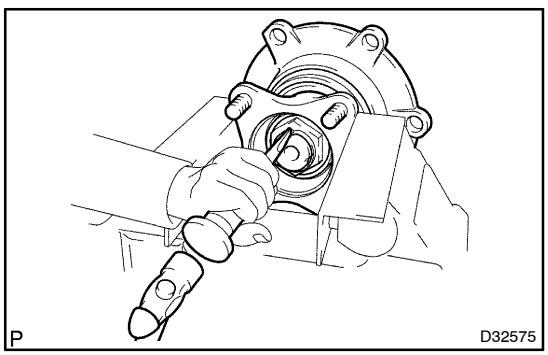



(c) Using SST, remove the inner race from the drive pinion.
SST 09950–00030, 09950–00020

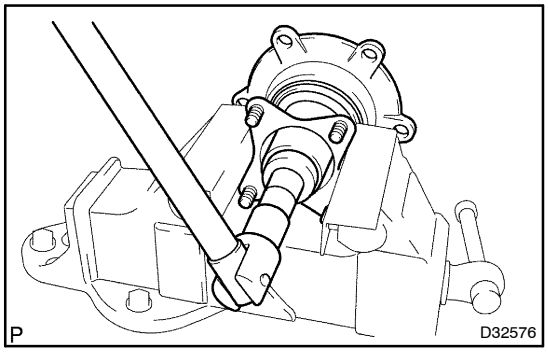



**13. REMOVE REAR DRIVE PINION COMPANION FLANGE**

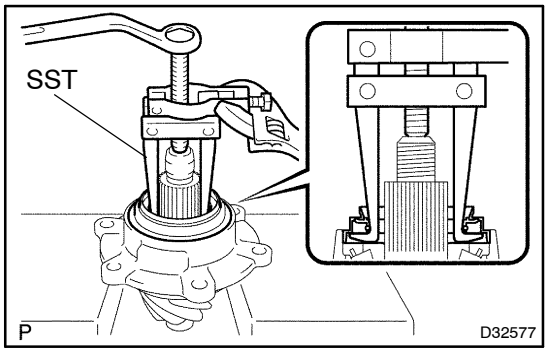
(a) Using a vise, hold the companion flange.




(b) Using a chisel and hammer, unstake the lock nut.

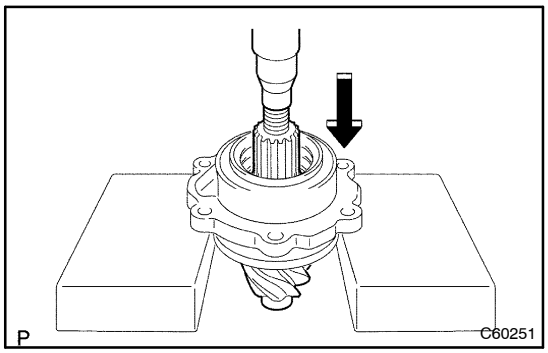



(c) Remove the lock nut and companion flange.



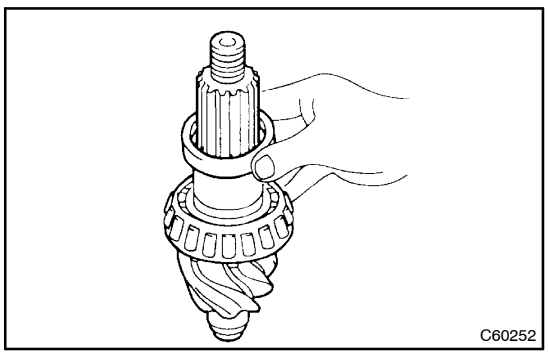

**14. REMOVE REAR DIFFERENTIAL CARRIER OIL SEAL**

(a) Using SST, remove the oil seal.
SST 09308–10010

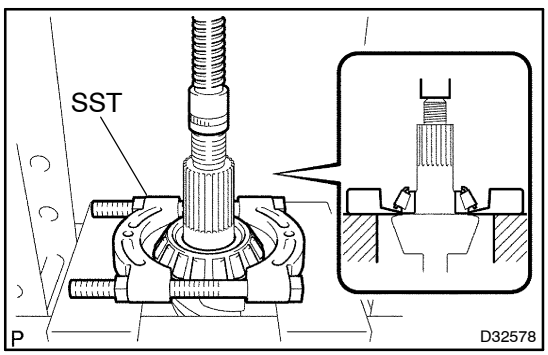



**15. REMOVE DIFFERENTIAL DRIVE PINION**

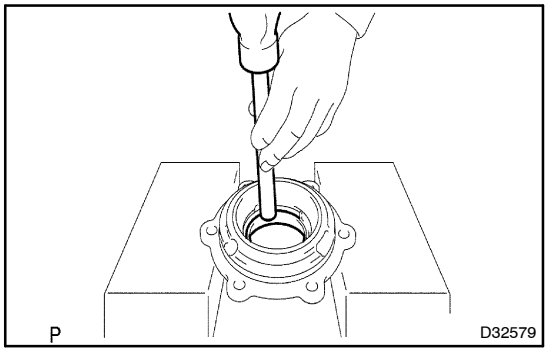
(a) Using a press, press out the drive pinion from the drive pinion cage.




(b) Remove the drive pinion bearing spacer.




(c) Using SST and a press, press out the rear bearing inner race.
SST 09950–00020



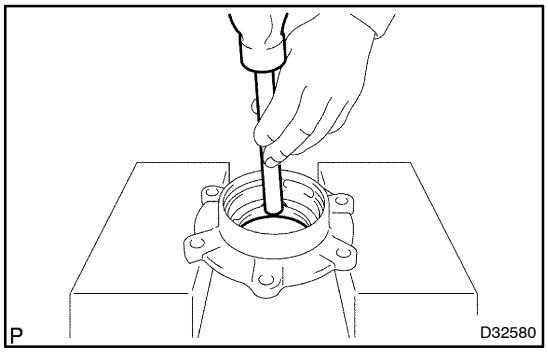

**16. REMOVE FRONT BEARING OUTER RACE**

(a) Using a brass bar and hammer, tap out the bearing oil seal.

(b) Using a brass bar and hammer, tap out the bearing outer race.

**NOTICE:**

**Do not damage the inner surface of the cage.**

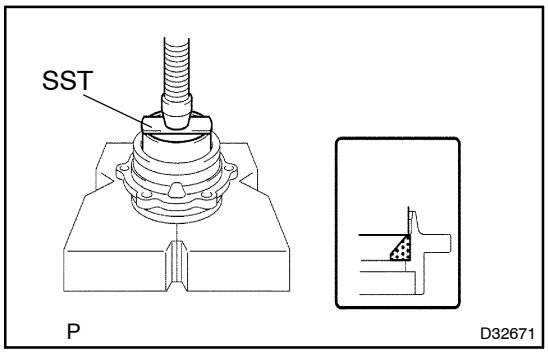



**17. REMOVE REAR BEARING OUTER RACE**

(a) Using a brass bar and hammer, tap out the bearing outer race.

**NOTICE:**

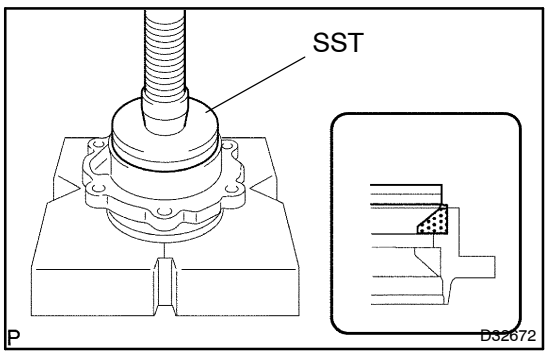
**Do not damage the inner surface of the cage.**




**18. INSTALL FRONT BEARING OUTER RACE**

(a) Using SST and a press, press in the front bearing outer race onto the differential cage.

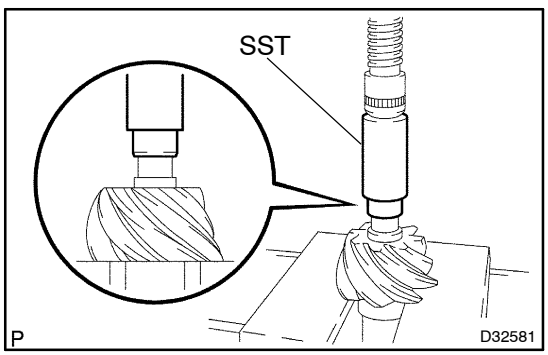
SST 09518–36020




**19. INSTALL REAR BEARING OUTER RACE**

(a) Using SST and a press, press in the rear bearing outer race onto the differential cage.

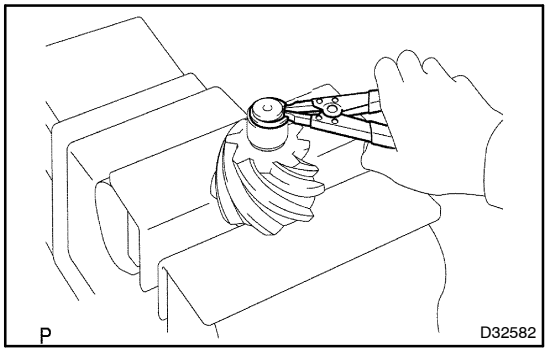
SST 09223–78010




**20. INSTALL PILOT BEARING INNER RACE**

(a) Using SST and a press, press in the inner race onto the shaft of the drive pinion.

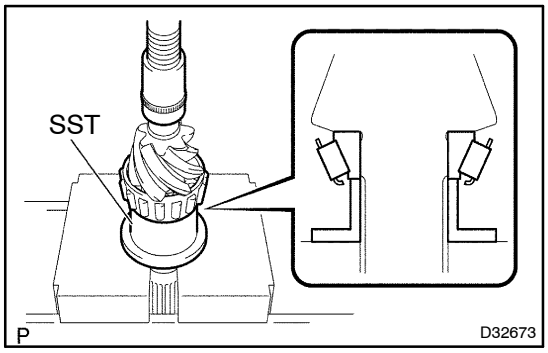
SST 09316–60011 (09316–00011, 09316–00071)




(b) Using a snap ring expander, install a new snap ring in the groove on the drive pinion tip.

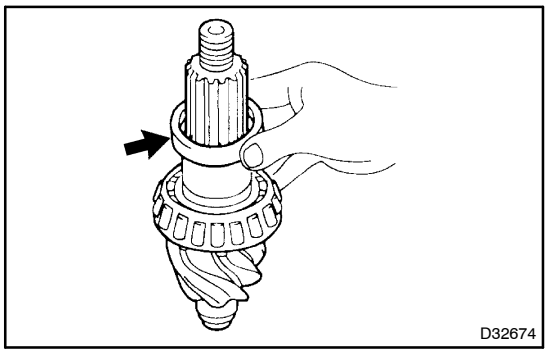
**NOTICE:**

**Use a cloth or similar object as a cover, at the time of snap ring installation, to prevent the snap ring from flying off.**

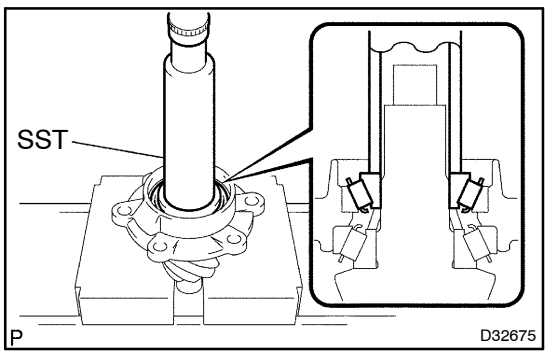



**21. INSTALL REAR BEARING INNER RACE**

(a) Using SST and a press, press in the inner race onto the drive pinion.
SST 09315–00022

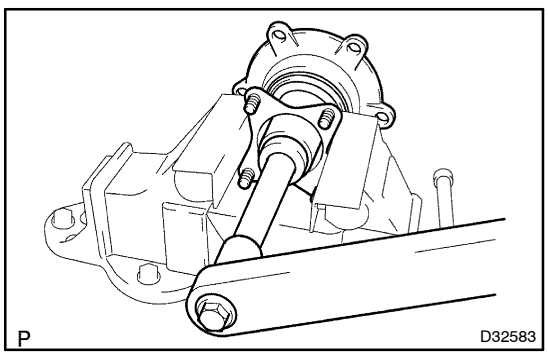



(b) Install the differential drive pinion bearing spacer.




**22. INSTALL DIFFERENTIAL DRIVE PINION BEARING CAGE**

(a) Using SST and a press, press in the drive pinion cage and front bearing inner race onto the drive pinion.
SST 09316–60011



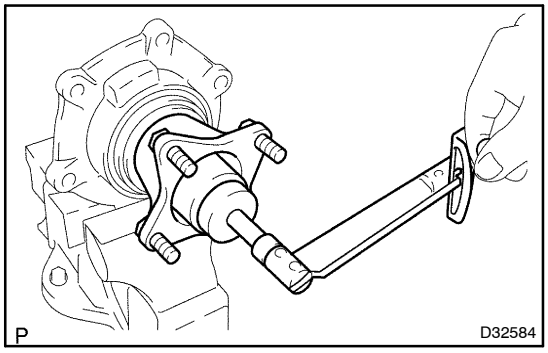

**23. ADJUST DIFFERENTIAL DRIVE PINION PRELOAD**

(a) Install the flange yoke and a new lock nut on the drive pinion, and fix the drive pinion assembly in a vise.

(b) Using a deep socket wrench (36 mm), tighten the lock nut.
**Torque: 435 N·m (4,440 kgf·cm, 321 ft·lbf)**

**NOTICE:**

**Do not install an oil seal before preload measurement.**



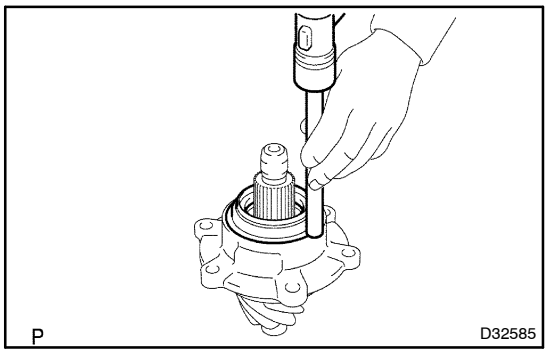

(c) Using a torque wrench, measure the preload at the lock nut part.
**Preload:**

| | |
|---|---|
| New bearing | 1.97 to 2.94 N·m (20 to 30 kgf·cm, 17 to 26 in.·lbf) |
| Reused bearing | 1.47 to 2.45 N·m (15 to 25 kgf·cm, 13 to 22 in.·lbf) |

**NOTICE:**
**When either bearing is new, use the preload for a new bearing.**

(d) When the measured value exceeds the specified preload, select a spacer by increasing or decreasing the value and adjust the preload.
**Spacer thickness:**

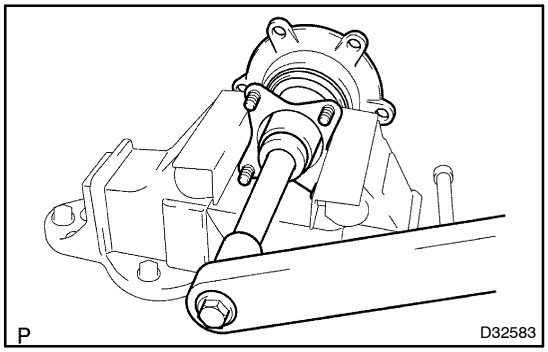
| | |
|---|---|
| 14.400 mm (0.5669 in.) | 14.650 mm (0.5768 in.) |
| 14.425 mm (0.5679 in.) | 14.675 mm (0.5778 in.) |
| 14.450 mm (0.5689 in.) | 14.700 mm (0.5787 in.) |
| 14.475 mm (0.5699 in.) | 14.725 mm (0.5797 in.) |
| 14.500 mm (0.5709 in.) | 14.750 mm (0.5807 in.) |
| 14.525 mm (0.5719 in.) | 14.775 mm (0.5817 in.) |
| 14.550 mm (0.5728 in.) | 14.800 mm (0.5827 in.) |
| 14.575 mm (0.5738 in.) | 14.825 mm (0.5837 in.) |
| 14.600 mm (0.5748 in.) | 14.850 mm (0.5846 in.) |
| 14.625 mm (0.5758 in.) | 14.875 mm (0.5856 in.) |




**24. INSTALL REAR DIFFERENTIAL CARRIER OIL SEAL**

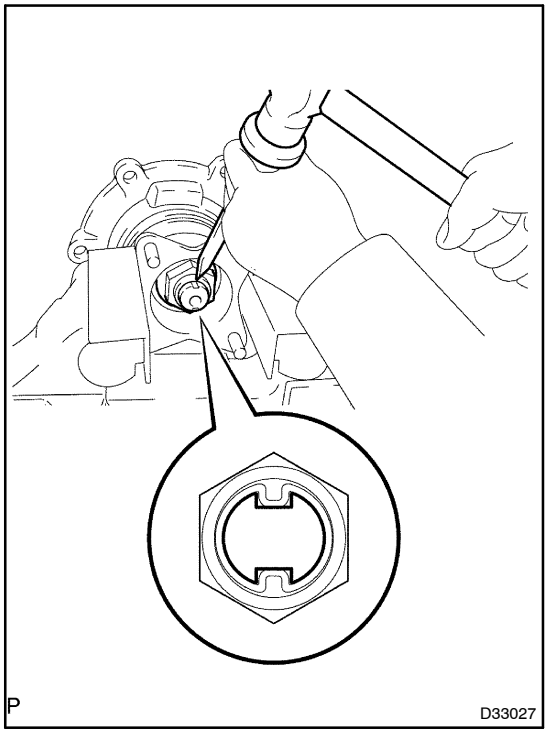
(a) After preload adjustment, remove the companion flange and use a plastic hammer to tap in a new oil seal into the differential carrier cage.

**NOTICE:**
**Hit the oil seal uniformly to drive it in.**

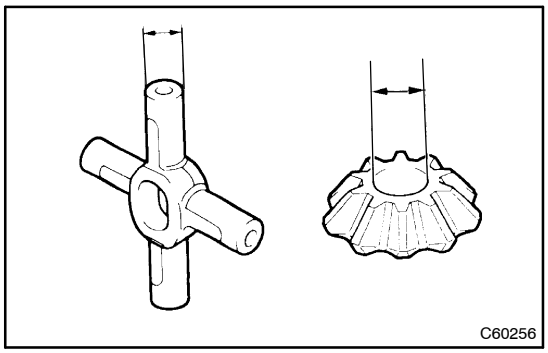



**25. INSTALL REAR DRIVE PINION COMPANION FLANGE**

(a) Install the companion flange with the lock nut.
**Torque: 435 N·m (4,450 kgf·cm, 322 ft·lbf)**




(b) Using a chisel and hammer, caulk the lock nut positively at the shaft groove (2 places).




**26. INSPECT SPIDER BEARING**

(a) Using a micrometer, measure the outer diameter of the spider.

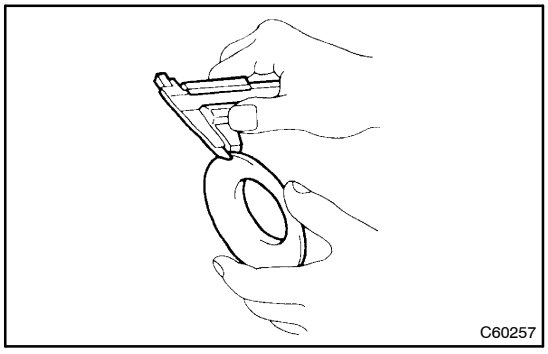
(b) Using a caliper gauge, measure the inner diameter of the pinion.

(c) Measure the clearance by subtracting the outer diameter of the spider from the inner diameter of the pinion.

**Clearance:**

| | |
|---|---|
| Standard | 0.140 to 0.261 mm (0.0055 to 0.0103 in.) |
| Maximum | 0.4 mm (0.016 in.) |

If the clearance is greater than the maximum, replace the spider bearing.




**27. INSPECT SIDE GEAR THRUST WASHER AND PINION THRUST WASHER**

(a) Using a vernier caliper, measure the thickness of the side gear thrust washer and pinon gear thrust washer.

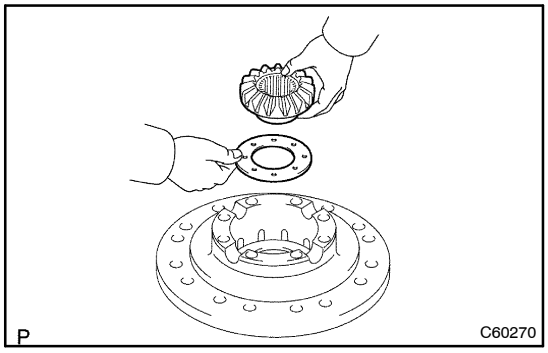
**Thickness of side gear thrust washer:**

| | |
|---|---|
| Standard | 1.9 to 2.1 mm (0.075 to 0.083 in.) |
| Minimum | 1.7 mm (0.070 in.) |

**Thickness of pinion gear thrust washer:**

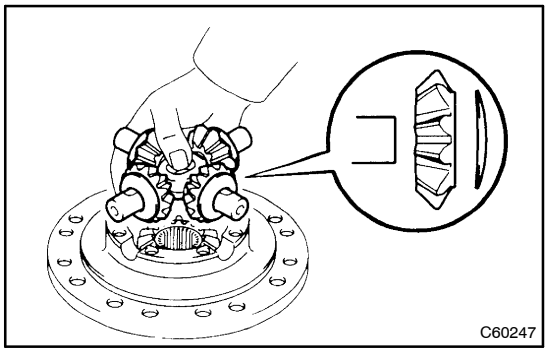
| | |
|---|---|
| Standard | 1.5 to 1.7 mm (0.059 to 0.070 in.) |
| Minimum | 1.3 mm (0.051 in.) |

If the value is less than the minimum, replace the side gear thrust washer or pinon gear thrust washer.



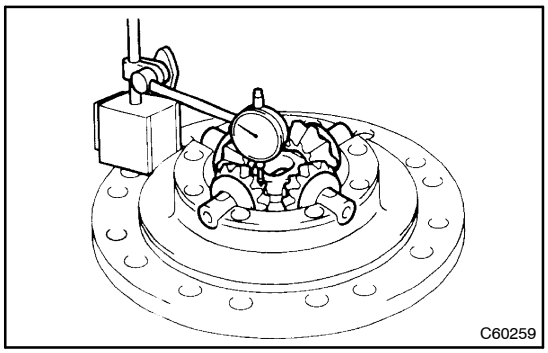

**28. INSTALL REAR DIFFERENTIAL SPIDER**

(a) Install the thrust washer on the slide gear.




(b) Install the 4 pinion gears and 4 thrust washers to the spider.

(c) Install the spider with the pinion gears to the LH case.




**29. ADJUST DIFFERENTIAL SIDE GEAR BACKLASH**

(a) Using a dial gauge, measure the side gear backlash.

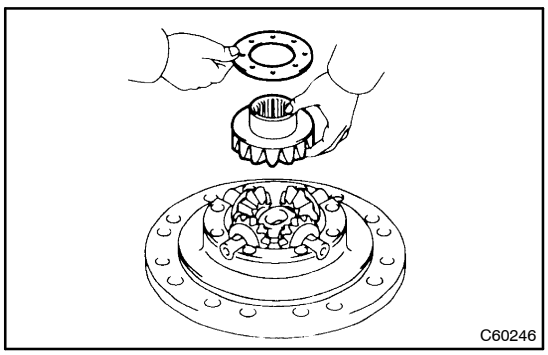
**Backlash:**

| | |
|---|---|
| Standard | 0.20 to 0.60 mm (0.0079 to 0.0236 in.) |
| Maximum | 0.9 mm (0.035 in.) |

If the backlash is greater than the maximum, replace the parts.

HINT:

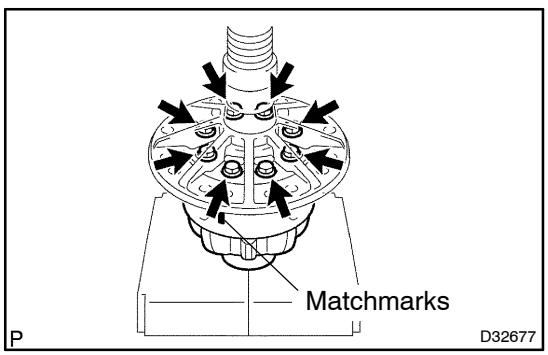
Measure the backlash at the RH case and LH case.




**30. INSTALL REAR DIFFERENTIAL SIDE GEAR**

(a) Install the side gear and thrust washer to the RH case.

(b) Apply gear oil to each part.




**31. INSTALL DIFFERENTIAL CASE**

(a) Align the matchmarks on the differential cases LH and RH.

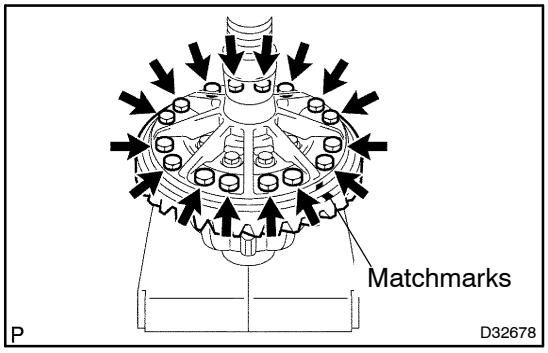
(b) Using a press, fix the differential.

(c) Apply sealant to the threads of the 8 bolts and install them.

**Sealant:**

**Part No. 08833–00100, THREE BOND 1360K or equivalent**

**Torque: 190 N·m (1,950 kgf·cm, 141 ft·lbf)**




**32. INSTALL DIFFERENTIAL RING GEAR**

(a) Align the matchmarks on the ring gear and differential.

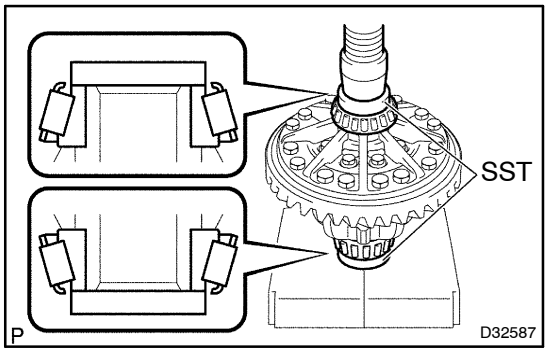
(b) Using a press, fix the differential.

(c) Apply sealant to the threads of the 16 bolts and install them.

**Sealant:**

**Part No. 08833–00100, THREE BOND 1360K or equivalent**

**Torque: 190 N·m (1,950 kgf·cm, 141 ft·lbf)**




**33. INSTALL SIDE BEARING INNER RACE**

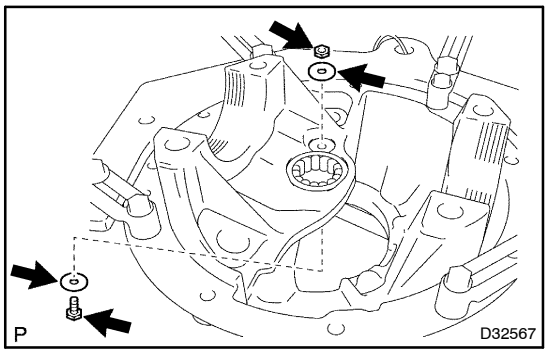
(a) Install the side spacer to the differential case LH.

(b) Using SST and a press, press in the 2 inner races onto the differential case.

SST 09223–15020, 09950–60010 (09951–00640, 09951–00650)

**NOTICE:**

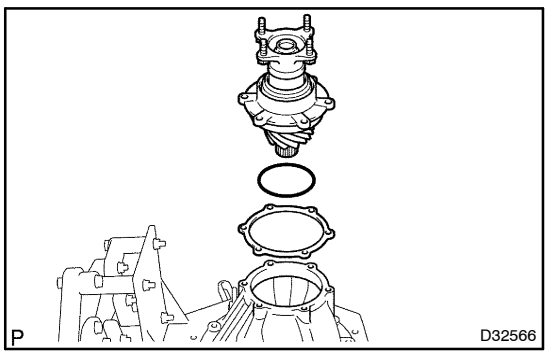
**Check that the left and right inner races are not interchanged.**




**34. INSTALL PILOT BEARING OUTER RACE**

(a) Install the bearing with the 2 retainers, a new bolt and nut.

**Torque: 22 N·m (225 kgf·cm, 16 ft·lbf)**




**35. INSTALL DRIVE PINION SUB–ASSY**

(a) Apply bearing grease to a new O–ring.

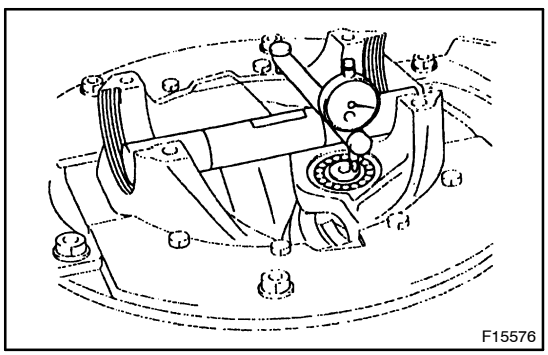
(b) Install the O–ring to the groove of the differential carrier cage.

**NOTICE:**

**Be sure to use a new O–ring.**

(c) Install the drive pinion and O–ring to the differential carrier with the 6 bolts and shims.

**Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)**




(d) Measure the depth from the installation surface of the side bearing to the tip of the drive pinion (this depth is the conical distance).

**Conical distance (Reference): 27.0 mm (1.063 in.)**

HINT:

- Make a note of the dimension of the error when manufactured which is stamped on the pinion tip before the installation of the drive pinion, then use it to calculate the conical distance.

- The conical distance is the basic dimension when the tooth contact of the drive pinion and the ring gear is adjusted. Setting them in this dimension makes the tooth contact best. Additionally, because of machine processing, dimension of the error when manufactured against the standard dimension is stamped on the tip of the pinion. The dimension that takes dimension of the error when manufactured and the standard dimension into account is the basic dimension.

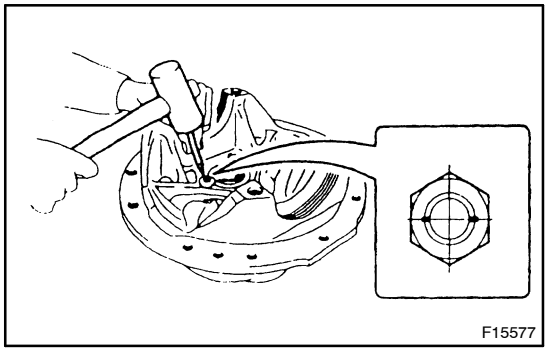
(e) Depending on the difference between the measured value and reference value (conical distance), adjust the thickness of the shim.

**Shim thickness:**

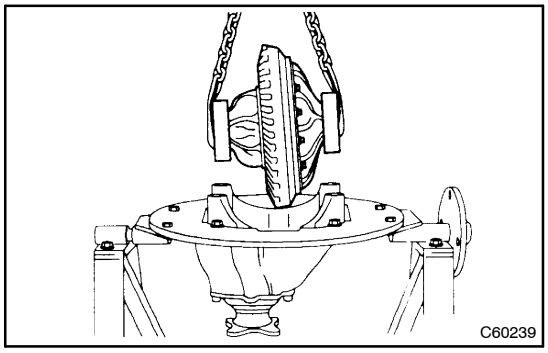
| | |
|---|---|
| 0.30 mm (0.0118 in.) | 0.45 mm (0.0177 in.) |
| 0.40 mm (0.0157 in.) | 0.50 mm (0.0197 in.) |

HINT:

- Basic value = Standard value + Dimension of the error when manufactured
- When dimension of the error when manufactured is stamped by –20, the actual dimension of the error when manufactured means –0.2 mm (–0.0079 in.).
  (Standard value + Dimension of the error when manufactured = Basic Dimension [21.5 mm (0.8465 in.) + (–0.2 mm (–0.0079 in.)) = 21.3 mm (0.8386 in.)])


F15577

(f) Using a punch, caulk the 2 portions of the pilot bearing lock nut.


C60239

**36. INSTALL REAR DIFFERENTIAL CASE SUB–ASSY**

(a) Place the bearing outer races on their respective bearings.

**NOTICE:**

**Check that the left and right outer races are not interchanged.**

(b) Using a chain block, install the differential case.

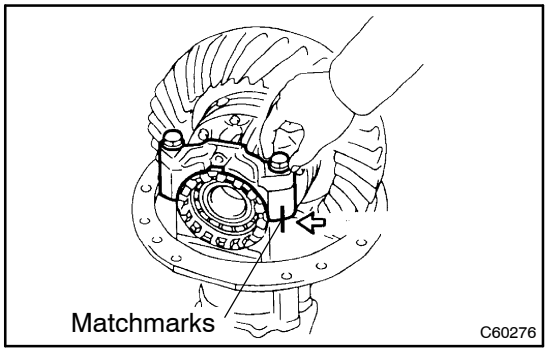
HINT:

Tilting the differential gear assy, install the differential carrier.

(c) Install the 2 adjusting nuts on the carrier and make sure the nuts are properly threaded.

HINT:

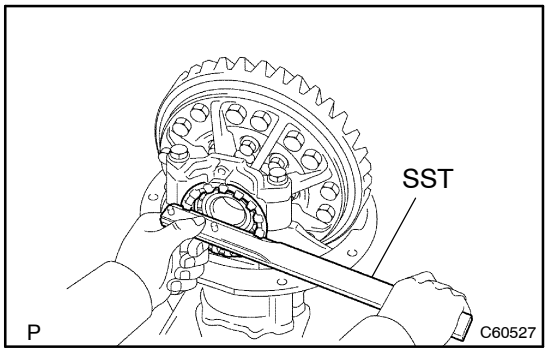
Making the 2 adjusting nuts horizontal to the side bearing, insert them from the top of the differential carrier.




(d) Align the matchmarks on the cap and carrier. Temporarily install the side bearing caps with the bolt.

HINT:

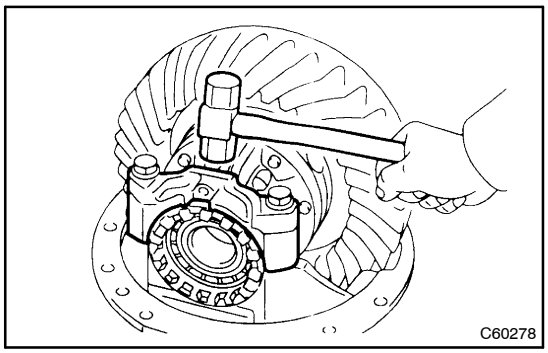
If the bearing cap does not tightly fit the carrier, the adjusting nuts may not be properly threaded. Reinstall the adjusting nuts if necessary.



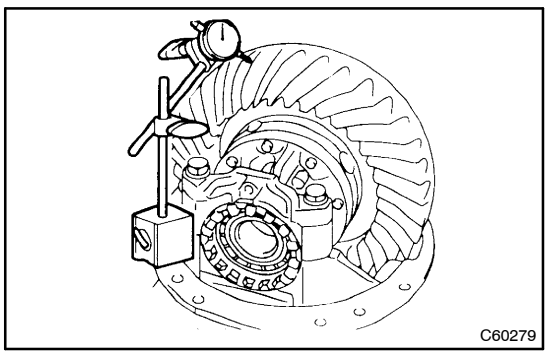

**37. ADJUST DIFFERENTIAL SIDE BEARING PRELOAD**

(a) Using SST, fully tighten the adjusting nut on the ring gear side. Then, loosen the nut by the 1/4 rotation.
SST 09504–00011

(b) Use the same procedures on the other side.




(c) Using a hammer, lightly tap the top of the side bearing cap so that the bearing fits.



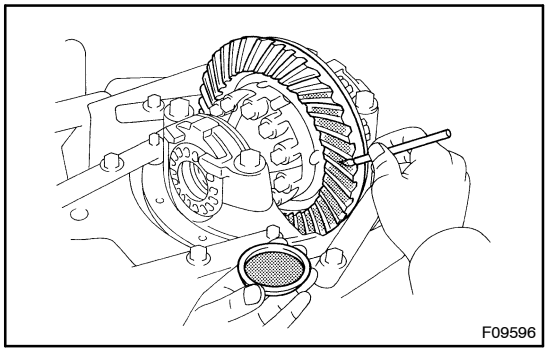

(d) Using a dial gauge, measure the backlash.
**Backlash:**

| Reduction Ratio | Standard |
|---|---|
| 5.571 | 0.20 to 0.28 mm (0.0079 to 0.0110 in.) |
| 5.833 | 0.25 to 0.33 mm (0.0098 to 0.0130 in.) |

HINT:

Perform the measurements at 3 or more positions around the circumfence of the ring gear, and adjust the side bearing preload as necessary.

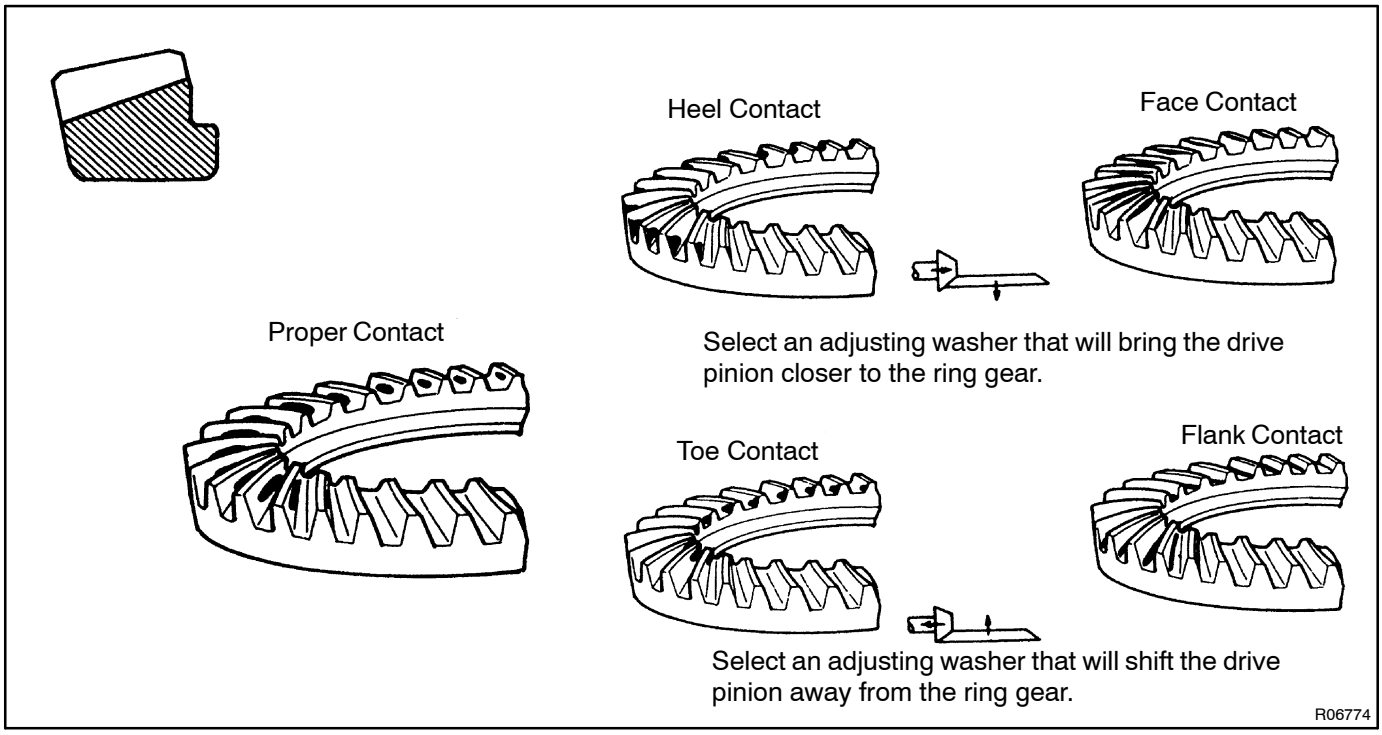
(e) The backlash should be adjusted by turning the left and right adjusting nuts by equal amounts. For example, loosen the nut on the left side one notch and torque the nut on the right side one notch.

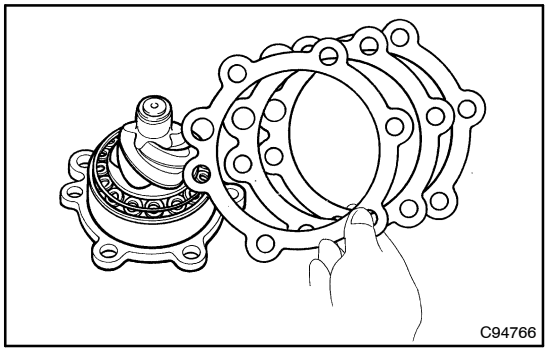

F09596

**38. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION**

(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead.

(b) Turn the companion flange in both directions to inspect the ring gear for proper tooth contact.



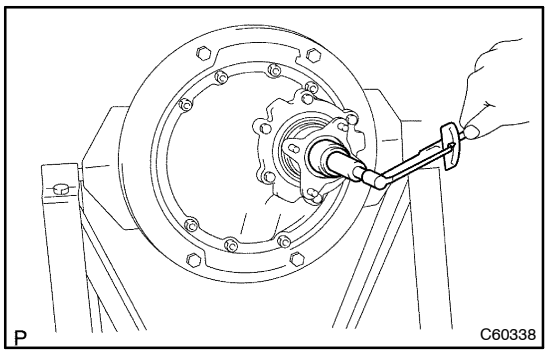


C94766

If the teeth are not properly contacting each other other, use the value below to select a proper shim for correction.

**Shim thickness:**

| | |
|---|---|
| 0.30 mm (0.0118 in.) | 0.40 mm (0.0157 in.) |
| 0.45 mm (0.0177 in.) | 0.50 mm (0.0197 in.) |

HINT:
Use one or more shims for adjustment.


P C60338

**39. MEASURE TOTAL PRELOAD**

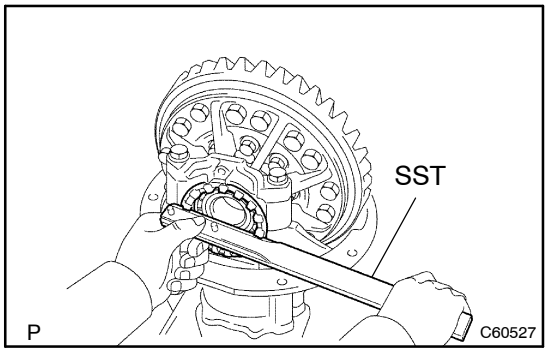
(a) Using a torque wrench, measure the total preload.

**Preload (new bearing):**

| Reduction Ratio | Standard |
|---|---|
| 5.571 | 0.27 to 0.35 N·m (2.7 to 3.5 kgf·cm, 2.4 to 3.1 in.·lbf) |
| 5.833 | 0.26 to 0.33 N·m (2.6 to 3.4 kgf·cm, 2.3 to 2.9 in.·lbf) |

**Preload (reused bearing):**

| Reduction Ratio | Standard |
|---|---|
| 5.571 | 0.18 to 0.26 N·m (1.8 to 2.6 kgf·cm, 1.6 to 2.3 in.·lbf) |
| 5.833 | 0.17 to 0.25 N·m (1.8 to 2.5 kgf·cm, 1.5 to 2.2 in.·lbf) |

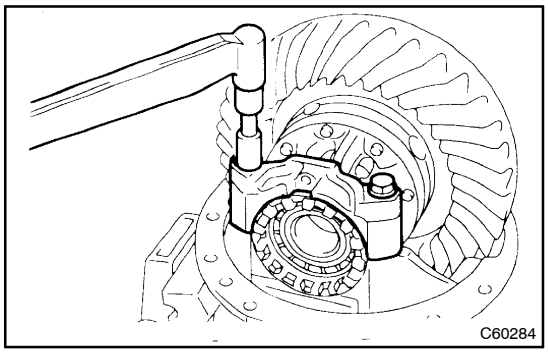



If the result is not as specified, then turn the left/right adjusting nuts using SST to adjust the preload.

SST 09504–00011

**NOTICE:**

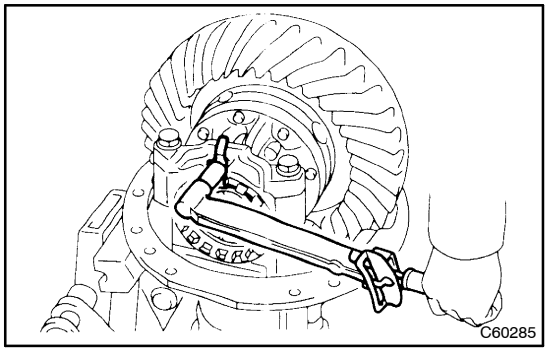
**When adjusting with the adjusting nuts, tighten one and another by an equal amount so that the adjustment of the backlash will not be out of order.**




(b) Tighten the 2 bearing caps with the 4 bolts.
**Torque: 210 N·m (2,150 kgf·cm, 156 ft·lbf)**

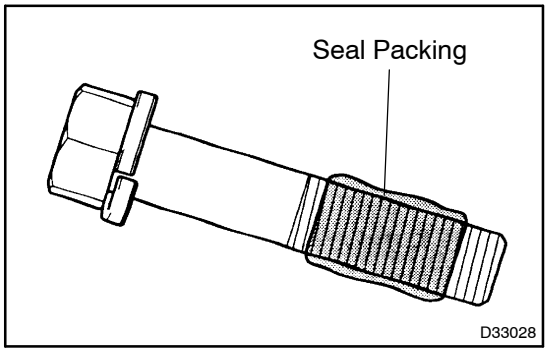
(c) Recheck the total preload.

(d) Recheck the ring gear backlash (see step 37).




**40. INSTALL REAR DIFFERENTIAL BEARING ADJUSTING NUT LOCK**

(a) Install 2 new nut locks on the bearing caps.
**Torque: 22 N·m (225 kgf·cm, 16 ft·lbf)**




**41. INSTALL REAR DIFFERENTIAL CARRIER ASSY**

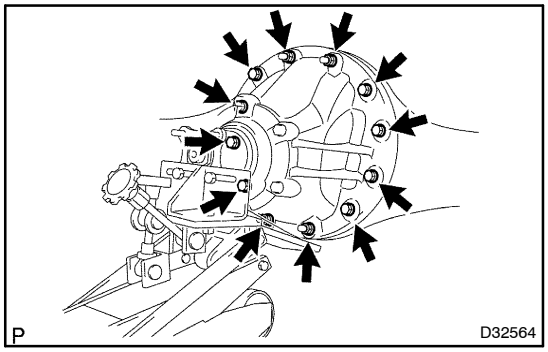
(a) Clean the contact surface of the differential case and rear axle housing.

(b) Apply seal packing to a new gasket, and install that to the rear axle housing.
**Seal packing: Three bond 1215 or 1216**

(c) Apply seal packing to the differential carrier bolts.
**Seal packing: Three bond 1215 or 1216**

**NOTICE:**

**Install the bolts within 20 minutes after seal packing is applied.**




(d) Using a jack, install the differential carrier into the axle housing with the 8 bolts and 4 nuts.
**Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)**

**42. INSTALL PROPELLER SHAFT ASSY (See pub No. RM1008E, page 30–4 or 30–11)**
**43. INSTALL REAR AXLE SHAFT (See pub No. RM1008E, page 30–72 or 30–75)**
**44. ADD DIFFERENTIAL OIL (See page 29–3)**